



**ComEd**

# **Data Centers Efficiency Program Evaluation Report**

**FINAL  
Energy Efficiency / Demand Response Plan:  
Plan Year 8 (PY8)  
(6/1/2015-5/31/2016)**

**Presented to  
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## E. EXECUTIVE SUMMARY

This report presents a summary of the findings and results from the impact evaluation of the PY8<sup>1</sup> Data Centers Efficiency program. ComEd’s Smart Ideas for Your Business suite of energy efficiency programs includes a Data Centers Efficiency program which provides incentives to both new and existing data centers for implementing program-eligible energy efficiency measures. The program pays an incentive of \$0.07/kWh saved for eligible projects, up to a maximum of 100 percent of the total project cost and 100 percent of the incremental project cost. The primary objectives of this evaluation are to quantify gross and net impacts, identify impact-related program strengths and weaknesses and identify ways to improve the program.

### E.1. Program Savings

Table E-1 summarizes the electricity savings from the Data Centers Efficiency Program.

**Table E-1. PY8 Total Program Electric Savings**

Savings Category	Energy Savings (MWh)	Peak Demand Savings (MW)
Ex Ante Gross Savings	18,618	1.715
Verified Gross Savings	19,153	1.759
Verified Net Savings	11,492	1.002

*Source: ComEd tracking data and Navigant team analysis.*

Based on the gross impact sample of eight projects in PY8, the evaluation results yielded an energy and peak demand gross realization rate of 1.03. The relative precision for the gross impact results at one-tailed 90 percent confidence level is  $\pm 5$  percent for the energy realization rate and  $\pm 2$  percent for the peak-demand realization rate. To calculate net savings, the evaluation team used a deemed net-to-gross ratio (NTGR) of 0.6 for energy and 0.57 for demand in accordance with the Illinois Stakeholder Advisory Group (SAG)-approved values. These deemed net-to-gross ratios (NTGR) for energy and demand are based on the PY6 NTG analysis.

Overall, the program team succeeded in ensuring the installation and proper operation of the implemented measures. The program team continues to collect site-specific pre- and post-metered data for all projects, which enables accurate estimation of ex-ante savings. In general, the program team successfully collected site specific pre- and post-measurement and verification (M&V) data using acceptable methods based on industry practices. The M&V data provided by the program team was useful for the evaluation and allowed the evaluation team to complete the analysis for five of the eight projects in the sample using a desk review procedure. For these five projects, the evaluation team conducted a telephone interview with the site contact to verify the installation of the equipment, validate the data provided by the program team and facilitate the collection of missing data needed to complete the review.

<sup>1</sup> The PY8 program year began June 1, 2015 and ended May 31, 2016.

## E.2. Results Summary

The following table summarizes the key metrics from PY8.

**Table E-2. PY8 Results Savings**

Participation	Units	PY8
Verified Net Savings	MWh	11,492
Verified Net Demand Reduction	MW	1.00
Verified Gross Savings	MWh	19,153
Verified Gross Demand Reduction	MW	1.76
Program Realization Rate	%	1.03
Program Demand Realization Rate	%	1.03
Program NTG Ratio †	#	0.60
Program Demand NTG Ratio †	#	0.57
Projects Completed	#	29

*Source: ComEd tracking data and Navigant team analysis.*

† A deemed value. Source: ComEd\_NTG\_History\_and\_PY8\_Recommendation\_2016-02-

26\_Final\_EMV\_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

## E.3. Findings and Recommendations

The PY8 Data Centers Efficiency program gross energy and demand realization rate of 1.03 is very good for a program that involves custom calculation methods based on site-specific M&V and analysis of complex and/or emerging technologies. These PY8 evaluation results indicate the program operates well and deploys technically competent staff to address an array of impact estimation and program design challenges. The implementation team has followed the recommendations from previous evaluation reports and has backed the savings estimates with solid M&V practices. Consequently, the key findings and recommendations for the Data Centers Efficiency program this year are limited; they are listed below.

### Evaluation Research Gross Impacts and Realization Rate

**Finding 1.** The PY8 gross sample saw three new construction data center projects. A review of the ex-ante savings approaches revealed that these projects used slightly different approaches to estimate the ex-ante savings. A further discussion on the different approaches taken in both the ex-ante and ex-post calculations and the overall effect of these different approaches can be found in the Appendix: Evaluation of Phased New Construction Projects .

**Recommendation 1.** The discussion on new construction data centers found in the Appendix is designed to guide future discussions between the evaluation team and ComEd. These discussions will help develop a consistent methodology for the Phased New Construction Data Center projects. Such discussions should include topics on baseline Uninterruptible Power Supply (UPS) efficiency and loads, minimum load requirements for the first phase of the New Construction Projects, and approaches used to true-up savings in later phases of the project.

**Finding 2.** The savings for three projects (Projects 17115, 22865 and 28043) in the PY8 gross sample were modified based on the ex-ante metered data supplied by ComEd. The changes included incorrectly including logged zero values and dropping or modifying the metering data used to reflect updated conditions.

**Recommendation 2.** Metered data reduces the uncertainty associated with the savings claims and is recommended whenever it is feasible. However, as with all data sources, it should go through a rigorous review. Faulty meter equipment, changes in operation and inaccurate metering periods can have an impact on the savings estimates. The evaluation team recommends that the implementation team closely review the metered data and make sure that the collected data represents normal operation. If there are any outliers in the data, the implementation team should exclude these data points from the analysis. Additionally, graphically representing the data can provide a good QC check to make sure that the metered data represents actual conditions.

**Finding 3.** A comment was noted by the ComEd team during review of one of the FSRs that they would like to discuss how to mitigate the impact of changes in the metering between ex-ante post metering and ex-post metering. This issue only affected savings for one site in PY8, but it is a topic seen in other projects in the past.

**Recommendation 3.** The evaluation team looks at the current operating conditions and identifies any changes in load or the operation of the equipment. The implementation team should ensure that a simple QC check is put in place to graphically view the data and ensure that meter data collected does not show changes in operation over the metering period. Discussions with the site contact about how the system will be used in the future may help to foresee changes in operation or load, which may help to determine metering periods required to calculate savings. For variable loads, a sufficient time period is also required to ensure that changes in load are captured, and the reason for their change is also determined and normalized (production levels, outdoor air temperatures, etc.).

## 1. INTRODUCTION

### 1.1 Program Description

The ComEd Smart Ideas for Your Business program provides incentives for business customers who upgrade their facilities with energy efficient equipment. This incentive program is available to all eligible, nonpublic, commercial and industrial customers in ComEd's service territory. ComEd's Smart Ideas for Your Business suite of energy efficiency programs includes a Data Centers Efficiency program. This program provides incentives to both new and existing data centers for implementing qualified energy efficiency measures.

The Data Centers Efficiency program pays an incentive of \$0.07/kWh saved for eligible projects. The program also provides an early commitment incentive option to the customers. The early commitment option provides incentive-funding certainty upon approval of an application. To qualify for this option, projects must reduce energy consumption by a minimum of 500,000 kWh. For qualifying early commitment projects, the program pays an incentive of \$0.06/kWh saved. The program pays incentives after the implementation team verifies that projects are successfully completed and are not subject to change based on actual verified kWh savings. Incentives cannot exceed 100 percent of the total project cost and 100 percent of the incremental project cost.

### 1.2 Evaluation Objectives

The Evaluation Team identified the following key researchable questions for PY8.

#### 1.2.1 Impact Questions

1. Estimate the gross impacts from the program.
2. Identify opportunities for improvement to program impact calculations and estimates.
3. Assess whether or not the program has met its energy and demand savings goals

Estimate combined net impacts for PY8 and PY9. Provide up-front evaluation input for large or complex projects before the program finalizes applications and pays incentives.



## 2. EVALUATION APPROACH

Program Year 8 (PY8) represents the fourth year of implementation for the Data Centers Efficiency program. For the PY8 impact evaluation, the evaluation team developed gross program impact results based on on-site data collection and associated measurement and verification (M&V) analysis for three projects and thorough engineering desk reviews supported with telephone interviews for five projects. The PY8 process evaluation was constrained to feedback from the PY8 participants on the program’s strengths and weaknesses.

### 2.1 Overview of Data Collection Activities

The core data collection activities included on-site surveys and detailed M&V analysis in support of gross impact analysis. Table 2-1 summarizes the data collection activities.

**Table 2-1. Primary Data Collection Activities**

What	Who	Target Completes	Completes Achieved	When	Comments
Onsite M&V Audit	Participants	3	3	July – October 2016	Sampled projects from Stratum 1 and 2.
Desk Reviews†	Participants	5	5	August – October 2016	Sampled projects from Stratum 2 and 3.
Telephone Survey‡	Participants	8	3	September – October 2016	Data collection supporting NTG research and process analysis.

† Reviews include engineer conducted telephone interviews.

‡ The telephone survey results are not used for the PY8 evaluation, but will be used to calculate a combined PY8 and PY9 NTGR. These telephone surveys are currently in progress and the evaluation team is in the process of completing the telephone surveys for the participants in the gross sample.

### 2.2 Verified Savings Parameters

Table 2-2 presents the parameters that were used in the verified gross and net savings calculations and indicates which were examined through evaluation activities and which were deemed.

**Table 2-2. Verified Savings Parameter Data Sources**

Gross Savings Input Parameters	Data Source	Deemed † or Evaluated?
Gross Energy Savings Realization Rate	PY8 Analysis	Evaluated
Gross Peak Demand Savings Realization Rate	PY8 Analysis	Evaluated
NTG Ratio	SAG†	Deemed†
Net Energy Savings	PY8 Analysis	Evaluated
Net Peak Demand Savings	PY8 Analysis	Evaluated

† Source: ComEd\_NTG\_History\_and\_PY8\_Recommendation\_2016-02-26\_Final\_EMV\_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

#### 2.2.1 Verified Gross Program Savings Analysis Approach

The objective of the gross program savings evaluation is to verify the veracity and accuracy of the PY8 ex-ante gross savings estimates in the Data Centers Efficiency program tracking system. The PY8 evaluation activities included on-site M&V analysis for three projects and desk reviews for five projects. The evaluation team evaluated the savings reported for the completed PY8 projects using the methods outlined below.

The evaluation team performed on-site audits for the two strata 1 projects and one of the two strata 2 projects (totaling three projects). On-site data collection included verification of measure installation, functioning system and planned system operation, and specific details of any variation between the ex-ante and ex post verifications. On-site audits also entailed collection of customer-stored data to support downstream M&V calculations. To calibrate the site-specific analyses, the evaluation team used measurement data obtained from the sites, including spot measurements, run-time hour data logging and post-installation interval metering. When available, the evaluation team obtained customer-supplied data from energy management systems (EMS) or supervisory control and data acquisition (SCADA) systems.

For the smaller projects (strata 2 and 3), engineering desk reviews were performed to calculate the ex-post impacts. Each of the desk reviews involved a review of project documentation provided by the program, engineering review of the algorithms and an audit of ex-ante calculation models used by the program to estimate energy and peak demand savings. The engineering review of program calculations determined if the inputs for the program calculations were reasonable and acceptable or if they needed any revisions based on evaluation findings. In addition to the desk reviews, the evaluation team completed telephone interviews with the site contacts for each site and used this information to verify the savings estimates. In addition, evaluation obtained post-installation operating data for some projects from the site contact. The evaluation team used this information to inform evaluated savings calculations.

The evaluation team performed engineering calculations to derive evaluated gross kWh and kW savings based on data collected during the on-site visit or the desk review process. The engineering reviews also included a preliminary judgment to identify those assumptions with higher uncertainty or potential to influence the program savings estimates. Data obtained from the sampled sites served to verify measure installation, determine installed measure characteristics, assess operating hours and relevant modes of operation, identify the characteristics of the replaced equipment, support the selection of baseline conditions and perform ex post savings calculations. The peak kW savings calculation methodology was consistent with PJM requirements<sup>2</sup> for each project. In the final step, the evaluation team discussed project-level results with the implementation teams and ComEd's program staff to ensure that both the evaluation team and the implementation team agreed on the project scope and details.

The EM&V team then estimated verified gross savings for each sample site and extrapolated from the sample to the population to calculate verified gross savings for the population. Section 2.3 describes additional details on the sampling approaches.

### **2.2.2 Verified Net Program Savings Analysis Approach**

The primary objective of the net savings analysis is to determine the program's net effect on customers' electricity usage. After the evaluation team assessed gross program impacts, the net program impacts are derived by estimating a NTGR that quantifies the percentage of the gross program impacts. The Illinois Stakeholder Advisory Group (SAG) determined NTG values be deemed prospectively and used to calculate verified net savings for this program. The table below shows the deemed NTG values and the PY8 verified net savings.

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<sup>2</sup> PJM defines the coincident summer peak period as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, during the months of June through August.

**Table 2-3. Verified Net Savings Parameters**

Input Parameters	Value	Deemed or Evaluated?
Energy Savings NTGR	0.60	Deemed (derived from PY6 evaluation results)
Peak Demand Savings NTGR	0.57	Deemed (derived from PY6 kWh evaluation results) †

† A deemed value. Source: ComEd\_NTG\_History\_and\_PY8\_Recommendation\_2016-02-26\_Final\_EMV\_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

Verified net energy and coincident peak demand savings were calculated by multiplying the verified gross savings estimates by the deemed NTGR. In PY8, the NTGR values used to calculate the verified net savings are based on NTGR research conducted in PY6. The NTGR evaluation results from PY6 for kWh is 0.60 and kW is 0.57. SAG approved and documented this NTGR method.<sup>3</sup>

As part of the PY8 evaluation, NTG analysis was not performed. The evaluation team performed the NTG interviews for the projects in the PY8 gross sample but the data will not be analyzed and reported for PY8. A combined analysis for PY8 and PY9 will be performed during the PY9 evaluation.

## 2.3 Sampling

### 2.3.1 Profile of Population

The table below presents the three sampling strata used in the evaluation of the Data Centers Efficiency program. This was based on a total of 29 tracking records with 20 unique customers. Table 2-4 presents the number of records by stratum, along with the claimed ex-ante gross MWh and kW.

**Table 2-4. PY8 Program Participation by Sampling Strata**

Sampling Stratum	Ex-Ante MWh Impact Claimed	Ex-Ante MW Impact Claimed	Tracking Records	Incentive Paid to Applicant (\$)
1	6,369	366	2	2,300,007
2	6,432	715	9	1,461,302
3	5,816	634	18	1,769,047
PY8 Total	18,618	1,715	29	5,530,356

Source: Evaluation Team analysis

### 2.3.2 Gross Impact (M&V) Sample

Consistent with the evaluation plan, the evaluation team used a stratified random sampling approach to select the gross impact sample of eight projects. The evaluation team sorted projects based upon the level of ex-ante kWh savings and placed the projects in three strata.

Table 2-5 provides a profile of the gross impact M&V sample for the Data Centers Efficiency program in comparison with the program population. Shown below is the resulting sample that was drawn that consists of eight projects. These projects make up almost nine million kWh of the ex-ante impact claim, which represents 48 percent of the ex-ante impact claim for the program population. Also shown are the ex-ante based kWh sample weights for each of the three stratum.

<sup>3</sup> Source: ComEd\_NTG\_History\_and\_PY8\_Recommendation\_2016-02-26\_Final\_EMV\_Recommendations.xlsx, found on the IL SAG website at <http://ilsag.info/net-to-gross-framework.html>.

**Table 2-5. PY8 Gross Impact Sample by Strata**

Sampling Strata	Population Summary			Completed Interviews		
	Number of Tracking Records (N)	Ex-ante MWh Impact Claimed	kWh Weights	Number of Tracking Records (n)	Ex-ante MWh	Sampled % of Population kWh
1	2	6,369	0.34	2	6,369	100%
2	9	6,432	0.35	3	1,936	30%
3	18	5,816	0.31	3	675	12%
PY8 Total	29	18,618	-	8	8,980	48%

Source: Evaluation Team analysis

### 2.3.3 Telephone Survey Sample

Per the evaluation plan, the target for the participant surveys was to capture NTG results for all eight participants in the gross sample for the Data Center Efficiency program in PY8. Data from these surveys were in support of the net-to-gross component of the evaluation and the process evaluation component.

### 3. GROSS IMPACT EVALUATION

The evaluation team reviewed ComEd’s tracking data extract to determine reported PY8 ex-ante gross savings. The evaluation team developed the verified gross program impacts for the evaluation of the Data Centers Efficiency program based on on-site-informed M&V analysis for three projects and engineering desk reviews for five projects.

#### 3.1 Tracking System Review

ComEd provided the evaluation team with direct access to their on-line tracking system and data for evaluation purposes. The on-line system was easy to work with and provided viewing access to the project tracking data and downloading rights to project documentation in electronic format for each project. This documentation was complete and greatly facilitated the evaluation efforts.

#### 3.2 Gross Program Impact Parameter Estimates

The evaluation team conducted research to validate the gross program impact parameters that the TRM did not specify, and the results informed the ex-post gross impact estimates. The verified gross impact results for PY8 are in Table 3-1 below.

**Table 3-1. Verified Gross Savings Parameters**

Gross Savings Input Parameters	Value	Deemed or Evaluated?
Energy Savings Realization Rate	1.03	Evaluated
Peak Summer Demand Savings Realization Rate	1.03	Evaluated

*Source: Evaluation Team analysis*

There are two basic statistical methods for combining individual gross realization rates from the sample projects into an estimate of verified gross kWh savings for the population when stratified random sampling is used. These two methods are referred to as “separate” and “combined” ratio estimation.<sup>4</sup> In the case of a separate ratio estimator, a separate gross kWh savings realization rate is calculated for each stratum and then combined. In the case of a combined ratio estimator, evaluation completes a single gross kWh savings-realization rate calculation without first calculating separate gross realization rates by stratum.

The evaluation team used the separate ratio estimation technique to estimate verified gross impacts for the Data Centers Efficiency program. The separate ratio estimation technique follows the steps outlined in the California Evaluation Framework<sup>5</sup>, which identifies best practices in program evaluation. The evaluation team matched these steps to the stratified random sampling method that they used to create the sample for the program. The evaluation team used the standard error to estimate the error bound around the estimate of verified gross impacts.

#### 3.3 Verified Gross Program Impact Results

Based on the gross impact sample size of eight projects in PY8, the evaluation results yielded gross energy realization rate of 1.03 and a gross demand realization rate of 1.03, resulting in a total program

<sup>4</sup> A full discussion and comparison of separate vs. combined ratio estimation can be found in Sampling Techniques, Cochran, 1977, pp. 164-169.

<sup>5</sup> Tec Market Works, “The California Evaluation Framework,” Prepared for the California Energy Commission, June 2004. Available at <http://www.calmac.org>

verified gross savings of 19,153 MWh and 1.76 MW as shown in Table 3-2. The table also presents savings by strata.

Overall, the program team was successful in ensuring the installation and operation of all of the implemented measures. The program team collected site-specific pre- and post-metered data for all projects, which enabled accurate estimation of ex-ante savings. In general, the program team successfully collected site-specific pre- and post-M&V data using acceptable methods based on industry practices. Since the evaluators did not collect M&V data for desk review projects, the program-collected M&V data was valuable in calculating evaluation-based savings for the sampled projects.

**Table 3-2. PY8 Verified Gross Impact Savings Estimates by Measure Type**

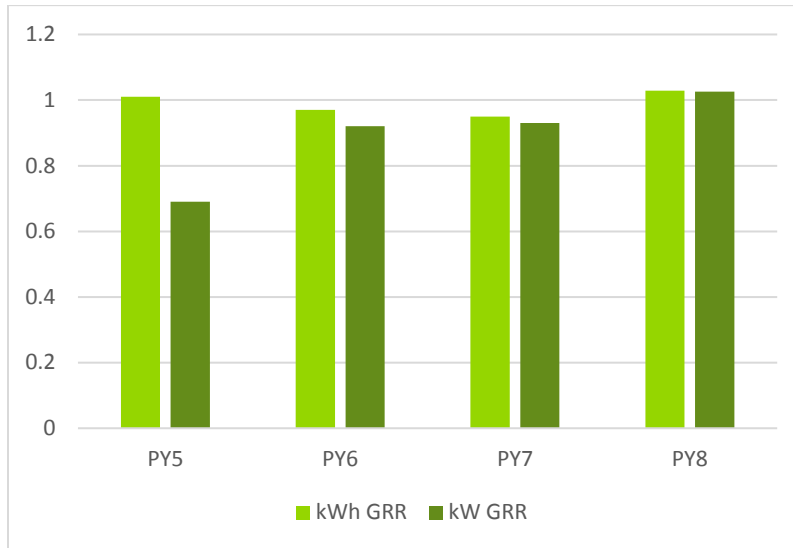
	Sample Size	Gross Energy Savings (MWh)	Gross Peak Demand Savings (MW)	Summer PJM Peak (MW)
<b>Strata 1</b>				
Ex-Ante Gross Savings		6,369	0.37	0.37
Verified Gross Realization Rate	2	122%	163%	163%
Verified Gross Savings		7,790	0.60	0.6
<b>Strata 2</b>				
Ex-Ante Gross Savings		6,432	0.72	0.72
Verified Gross Realization Rate	3	85%	72%	72%
Verified Gross Savings		5,444	0.52	0.5
<b>Strata 3</b>				
Ex-Ante Gross Savings		5,816	0.63	0.63
Verified Gross Realization Rate	3	102%	102%	102%
Verified Gross Savings		5,919	0.65	0.6
<b>Total</b>				
Ex-Ante Gross Savings		18,618	1.72	1.72
Verified Gross Realization Rate	8	103%	103%	103%
Verified Gross Savings		19,153	1.76	1.76

Source: Evaluation Team analysis.

The PY8 Data Centers Efficiency program gross energy and demand realization rate of 1.03 is very good for a program that involves custom calculation methods based on site-specific M&V and analysis of complex and/or emerging technologies. This shows that the program is running smoothly and is backed by solid M&V practices.

The PY8 gross energy realization rate of 1.03 is higher than the PY7 gross energy realization rate of 0.95. Figure 3-1 shows the comparison between the realization rate and the sample size for all four program years. Note that PY5 is the first year for the Data Center program and sample size for that program year is only four projects.

Figure 3-1. Gross Realization Rates for PY5, PY6, PY7 and PY8

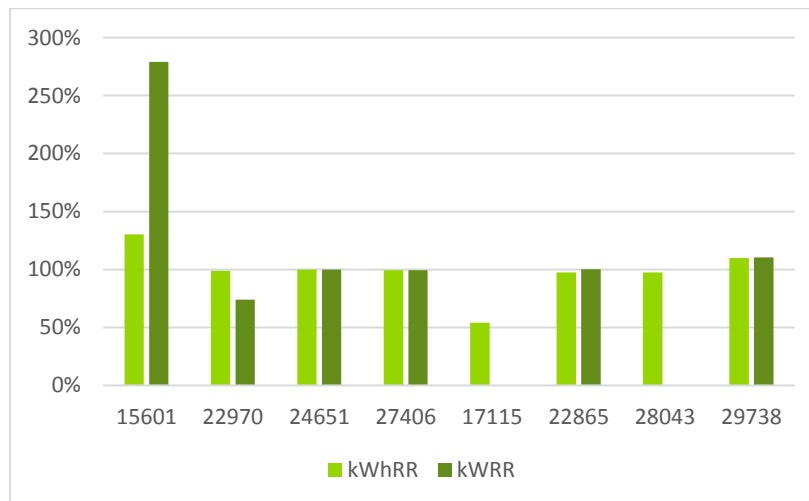


Source: Evaluation Team analysis

The PY8 demand realization rate of 1.03 also higher than the PY7 value of 0.95. Only two PY8 projects, 15601 and 17115, had ex-post energy savings estimates that differed substantially from the ex-ante savings estimates. For the remaining six projects, the gross energy and demand ex-post savings are within 10 percent of the ex-ante estimates.

Figure 3-2 below shows a comparison of the energy and demand realization rates for every site, broken down by strata. The PY8 energy-savings realization rate results ranged from 0.54 to 1.30, which resulted in a program level realization rate of 1.03. The demand-savings realization rates for the eight projects in the gross sample ranged from 0 percent to 279 percent. For five out of the eight projects, the realization rates were within 10 percent of one.<sup>6</sup>

Figure 3-2. Energy and Demand Realization Rates



Source: Evaluation Team analysis

<sup>6</sup> The project that received a 0% GRR for demand had only claimed 2.8 kW of demand savings.

The project level realization rates for each of the projects in the sample are found in Table 3-3.

**Table 3-3. PY8 Gross Impact Realization Rate Results for the Selected Sample**

Sampled Application ID	Sample-Based Ex-ante MWh Impact Claimed	Sample-Based Ex-ante kW Impact Claimed	Sampling Strata	Ex-ante-Based MWh Gross Impact Weights by Strata	Sample-Based Evaluation Verified Gross MWh Impact	Sample-Based Evaluation Verified Gross kW Impact	Application-Specific Evaluation Verified Gross MWh Realization Rate	Application-Specific Evaluation Verified Gross kW Realization Rate	Sample-Based Evaluation Verified Gross MWh Realization Rate	Sample-Based Evaluation Verified Gross kW Realization Rate
15601	4,838	129	1	0.76	6,300	360.90	1.30	2.79	1.22	1.63
22865	1,531	236	1	0.24	1,490	236.60	0.97	1.00		
22970	833	109	2	0.43	824	80.30	0.99	0.74		
17115	600	0	2	0.31	325	0.00	0.54	-	0.85	0.72
28043	502	3	2	0.26	489	0.00	0.97	0.00		
27406	313	36	3	0.46	311	35.50	1.00	0.99		
24651	226	26	3	0.33	226	25.79	1.00	1.00	1.02	1.02
29738	136	16	3	0.20	150	17.10	1.10	1.10		
<b>TOTAL</b>	<b>8,980</b>	<b>554</b>	<b>-</b>	<b>-</b>	<b>10,114</b>	<b>756</b>	<b>-</b>	<b>-</b>	<b>1.03</b>	<b>1.03</b>

Source: Evaluation Team analysis



The relative precision for the gross impact results at one-tailed 90 percent confidence level is  $\pm 6$  percent for the energy realization rate and  $\pm 2$  percent for the demand realization rate, as seen below in Table 3-4 and Table 3-5. The achieved relative precision rates at a one-tailed 90 percent confidence level for both energy and demand are within the range and even lower than the evaluation targeted energy realization rate of  $\pm 10$  percent. This is due to the close proximity to a 100 percent realization rate of the majority of the projects, and represents a stable program which performed its due diligence on the ex-ante savings analysis.

**Table 3-4. Gross kWh Realization Rates and Relative Precision at 90% Confidence Level**

Sampling Strata	Relative Precision $\pm\%$	Low	Mean	High
1	0%	1.22	1.22	1.22
2	18%	0.70	0.85	1.00
3	3%	0.99	1.02	1.05
<b>PY8 Total</b>	<b>5%</b>	<b>0.98</b>	<b>1.03</b>	<b>1.08</b>

Source: Evaluation Team analysis

**Table 3-5. Gross kW Realization Rates and Relative Precision at 90% Confidence Level**

Sampling Strata	Relative Precision $\pm\%$	Low	Mean	High
1	0%	1.63	1.63	1.63
2	6%	0.68	0.72	0.76
3	3%	0.99	1.02	1.05
<b>PY8 Total</b>	<b>2%</b>	<b>1.01</b>	<b>1.03</b>	<b>1.05</b>

Source: Evaluation Team analysis

The evaluation team has provided ComEd with site-specific M&V reports for each verified project. These site-specific impact evaluation reports summarize the ex-ante savings in the Final Application submitted, as well as the ex-post M&V plan, data collected at the site and all of the calculations and parameters used to estimate savings. Table 3-3 summarizes the results for each project. Although the overall project realization rates had close proximity to one for most of the projects, the evaluation team uncovered some issues in five of the eight projects. This could have resulted in large discrepancies in realization rates if they were not offset by other large discrepancies that swung the other way. Some key observations from these site-specific evaluation results are discussed below for each project which saw large differences in savings.

- Project #15601: There were two reasons for savings gap for this project. A small increase in savings was a result of changes identified in the calculation of condenser water supply temperatures in the Phase 1 chiller plant analysis. The ex post analysis used correlation coefficients in the most recent tab to determine the temperatures. The effect of this substitution was to reduce the estimated condenser water temperature at higher WB temperatures, which results in lower chiller kW/ton values. The second reason was two tiered, and resulted in a 28 percent increase in savings. Based on the discussions with the implementation team, inconsistencies identified in the ex-ante documentation were fixed. The full load design conditions and the UPS capacity had actually doubled from what was determined in the ex-ante final inspection report. The UPS capacity at full load design condition is 33.7 MW compared to IT load

of 16.85 MW. Additionally, the ex-ante approach used what was thought to be a conservative approach, using the minimum of the Phase I design baseline PUE or the full load design conditions PUE. None of the other new construction projects in PY8 took this approach. The evaluation team updated the UPS capacities, and compared final savings to a baseline PUE at Phase I conditions.

- Project #17115: The ex-ante analysis used trend data to calculate an average CRAC energy usage. However, the evaluation team realized that it appeared some of the logger data may have been faulty, and showed zero values even though the trend data indicated that the CRAC fans were running at their normal speed. This increased the average CRAC energy usage significantly for seven of the ten CRAC units, leading to a decrease in energy savings of almost 50 percent.
- Project #22865: Savings for the chiller load differed in the ex-ante and ex-post calculations due to a change in baseline efficiency due to a change in the IT loading. The evaluation team recalculated this baseline efficiency to match the ex-post IT loading, which was found to be five percent higher than the ex-ante factor. This change decreased savings by 15 percent for this project, but this effect was largely offset by increases in CRAH fan power and baseline efficiency due to the same change in IT load, which increased the savings by 12 percent.
- Project #22970: Data collection by the evaluation team found that average chiller loading increased over 15 percent between the ex-ante and the ex-post analysis period. Using the revised chiller load increased the project savings about 25 percent. However, this increase in savings was offset for the most part by an increase in baseline chiller efficiency calculated by the evaluation team. Due to the difference in the standard baseline chilled water temperature and the chilled water temperature of the facility (44°F vs 50°F), the savings were decreased by 25 percent. An additional change made by the evaluation team was related to demand savings. A reduction in savings came from a cell reference error in the calculations, where the ex-ante demand savings were calculated using the difference between baseline peak power and proposed average chiller power, where it should have used the proposed peak power instead. This resulted in a 25 percent decrease in demand savings.
- Project #29738: There was only change to this site's calculations. The evaluation team found that the new IT load for the facility had decreased 17 percent from the ex-ante post period. The ex-ante calculation had initially seen a 7 percent increase from the pre- to post- calculation period, but no normalization was performed. The evaluation team normalized the ex-post compressor power to reflect the current, updated IT loads, which increased savings by 10 percent.

#### 4. NET IMPACT EVALUATION

The Illinois Stakeholder Advisory Group (SAG)<sup>7</sup> determined that the NTG values for the Data Center Program should be deemed prospectively and used to calculate verified net savings. The table below shows the deemed NTG values and the PY8 verified net savings.

**Table 4-1. PY8 Verified Net Impact Savings Estimates by Measure Type**

Gross Savings Input Parameters	Value	Deemed or Evaluated?
Energy Savings Realization Rate	0.60	Deemed
Peak Summer Demand Savings Realization Rate	0.57	Deemed

*Source: Evaluation Team analysis*

Unlike previous program cycles, the PY8 program cycle did not perform NTG research to calculate NTGR based on the PY8 evaluation findings alone. Instead, the evaluation team and ComEd decided that a joint PY8/PY9 NTG evaluation would be performed. Therefore, the evaluation team performed telephone surveys of the eight gross sample points to determine their NTG scores, but the analysis will be performed and combined with the PY9 findings.

<sup>7</sup> Source: ComEd\_NTG\_History\_and\_PY8\_Recommendations\_2015-02-24\_v2\_clean.xls, which is to be found on the IL SAG website here: <http://ilsagfiles.org/>

## 5. FINDINGS AND RECOMMENDATIONS

There were three major findings that came out of the PY8 Data Centers gross program evaluation. These are summarized below.

### Evaluation Research Gross Impacts and Realization Rate

**Finding 1.** The PY8 gross sample saw three new construction data center projects. A review of the ex-ante savings approaches revealed that these projects used slightly different approaches to estimate the ex-ante savings. A further discussion on the different approaches taken in both the ex-ante and ex-post calculations, and the overall effect of these different approaches can be found in the Appendix: Evaluation of Phased New Construction Projects .

**Recommendation 1.** The discussion on new construction data centers found in the Appendix is designed to guide future discussions between the evaluation team and ComEd. These discussions will help develop a consistent methodology for the Phased New Construction Data Center projects. These discussions should include topics on baseline UPS efficiency and loads, minimum load requirements for Phase I and approaches used to true up savings in later phases of the project.

**Finding 2.** The savings for three projects (17115, 22865 and 28043) in the PY8 gross sample were modified based on the ex-ante metered data supplied by ComEd. The changes included incorrectly including logged zero values and dropping or modifying the metering data used to reflect updated conditions.

**Recommendation 2.** Metered data reduces the uncertainty associated with the savings claims and is recommended whenever it is feasible. However, as with all data sources, it should go through a rigorous review. Faulty meter equipment, changes in operation, and inaccurate metering periods can have an impact on the savings estimates. The evaluation team recommends that the implementation team closely review the metered data and make sure that the collected data represents normal operation. If there are any outliers in the data, the implementation team should exclude these data points from the analysis. Additionally, graphically representing the data can provide a good QC check to make sure that the metered data represents actual conditions. Similar finding and recommendation was also included in the PY7 Data Centers Report.

**Finding 3.** A comment was brought up by the ComEd team during review of one of the FSRs that they would like to discuss how to mitigate the impact of changes in the metering between ex-ante post metering and ex-post metering. This issue only affected savings for one site in PY8, but it is something that has been seen in other projects in the past.

**Recommendation 3.** The evaluation team looks at the current operating conditions and identifies any changes in load or the operation of the equipment. The implementation team should ensure that a simple QC check is put in place to graphically view the data and ensure that meter data collected does not show changes in operation over the metering period. Discussions with the site contact about how the system will be used in the future may help to foresee changes in operation or load, which may help to determine metering periods required to calculate savings or variable loads, a sufficient time period is also required to ensure that changes in load are captured, and the reason for their change is also determined and normalized (production levels, outdoor air temperatures, etc.). For PY9, the evaluation team would like to have a discussion on how to address these issues with the ComEd team.

## 6. APPENDIX

### 6.1 Evaluation Research Impact Approaches and Findings

The evaluation team identified an area for program improvement in their review of the ex-ante calculations, specifically for new construction data centers. This concern was also brought up by the ComEd team in discussions of project 15601. The following details will guide future conversations between the evaluation team and ComEd, in order to provide some consistency for future program savings calculations.

#### 6.1.1 Evaluation of Phased New Construction Projects

There were three new construction projects in the PY8 Data Center gross sample. These projects included 15601, 17115, and 22865. These project were in the first out of four build out phases and were generally designed to have savings claimed each year when the UPS load reaches design condition up to 25 percent load for Phase I, 50 percent for Phase II, 75 percent for Phase III, and 90 percent of design conditions for Phase IV. The savings for the phased new construction projects are trued up at each phase, based on the savings from the previous phases.

The evaluation team identified some inconsistencies or issues in some of these new construction projects that need to be addressed. The section below provides information on the inconsistencies and issues that provide guidance to future conversations between ComEd and the evaluation team. It is very important to use a consistent methodology to estimate the savings for these new construction projects that comply with the baseline guidance document.

- **Baseline UPS efficiency based on actual UPS load versus 25 percent minimum UPS load:** Actual UPS loads for the three Phase I projects ranged from 9 percent to 14 percent. The 2013 Data Center Baselines document states that “For UPS units running at less than 25 percent load factor, use the efficiency at 25 percent load factor in energy savings calculations.” The ex-ante calculations used a baseline efficiency based on a polynomial equation for UPS loads less than 25 percent. For the PY9 projects, the evaluation team would like to discuss about the usage of the polynomial equation for UPS loads less than 25 percent.
- **Phased design conditions versus Full Load design conditions to calculate baseline:** Ex-ante savings for one of the three projects were estimated using the minimum PUE between the full load design conditions and the phase I design conditions, to stay conservative in their approach. The evaluation team estimated the ex-post savings using the actual PUE instead of the PUE at full load design condition.
- **Phased Payouts:** Generally, these new construction data center projects are designed to have savings claimed each year when the UPS load reaches up to 25 percent for Phase I, 50 percent, for Phase II, 75 percent for Phase III, and 90 percent-100 percent for Phase IV. The UPS load for the three new construction projects vary between 9 percent to 14 percent. Since the UPS efficiency drops off at loads below 25 percent, the savings from the UPS were not considered for one of the project. The evaluation team would like to discuss about the possibility of waiting on these phase I projects until they meet certain load requirement.

The evaluation team provides project specific impact of some of the issues identified in the section above.

- **15601:** The ex-ante calculations for project 15601 used a minimum PUE approach between the full-load design conditions and the Phase I design conditions. After the evaluation team corrected other minor issues in the calculations, the effect of using the minimum PUE approach varied savings between 87 percent GRR to 130 percent GRR. Additionally, using the polynomial equation for baseline UPS efficiency for UPS load factors under 25 percent would have increased

the GRR even higher to 173 percent. These different approaches would have resulted in almost 100 percent swing in GRR, depending on the approach taken.

- **17115:** Ex-post evaluated GRR for this project ended up at 54 percent. However, no savings were included for the UPS system at this facility. Because the UPS load factor was low, the savings from the UPS unit were not considered in the scope of the project.
- **22865:** A large portion of the savings for this project come from the UPS unit. Similar to 17115, these savings are based on a baseline efficiency for the UPS which is calculated using the polynomial equation for UPS loads below 25 percent, rather than being based on a minimum 25 percent load as stated in the 2013 Data Center Baselines document. The ex-post savings are 97.3 percent, but if the calculation for this project used the baseline efficiency at 25 percent UPS load, the savings calculations would have dropped to -27.8 percent.

One large reason for these potentially low savings are due to the low UPS loads in the initial phase of the new construction project. The UPS efficiency drops significantly at loads under 25 percent, and even further under 15 percent loads. The evaluation team would like to have future conversations with ComEd to discuss how these Phased New Construction Data Center projects can be standardized to ensure that consistent methodologies are used in future projects and across later phases.

## 6.2 Participant Survey Instrument

### ***ComEd Smart Ideas for Your Business Program PY8 – NTG Data Center Professional Interview Guide***

Before we begin, I want to emphasize that this survey will only be about the energy efficient measures you installed through the Smart Ideas for Your Business Program in the data center at <ADDRESS>. [IF NECESSARY, READ PROJECT DESCRIPTION: <PROJDESC>]

Our records show that <COMPANY> received an incentive from ComEd for making changes to improve the energy efficiency of your data center (if new construction: for building an energy efficient data center) during <PROG YEAR>. [MENTION THE PROJECT DETAILS, INCLUDING MEASURE NAME(S) AND QUANTITIES, INSTALLATION DATES, AND INCENTIVE AMOUNTS HERE.] Does that sound right?

- 1 Yes
- 2 No

The purpose of this survey is to learn about your company's participation in ComEd's program, specifically to learn the role of the program in your company's decision to install energy efficient equipment as versus other factors that you had to consider. During this interview, this will be your opportunity to provide feedback directly to the program on any areas that you would like to see improved upon going forward, as well as any related suggestions for improvements. This survey will take between 30 and 45 minutes. Is now a good time?

## **NET-TO-GROSS MODULE**

### **VENDOR INFORMATION**

First, I would like to get some information on the firms that may have helped you with the design or implementation of this energy efficiency project.

- V1 Did you work with a contractor or vendor that helped you with the choice of this equipment?
  - 1 Yes
  - 2 No

If V1=1 THEN ASK:

V1a. What was the name of the firm(s) that helped you with your equipment choice?

**Answer:**

[IF <NEW CONSTRUCTION>=1, THEN ASK. ELSE SKIP TO V3.]

- V2 Did you also use a DESIGN or CONSULTING firm?
  - 1 Yes
  - 2 No

If V2=1 THEN ASK:

V2a. What is the name of the DESIGN or CONSULTING firm(s) that you used?

**Answer:**

- V3 [IF NEEDED] What was the name of the firm that conducted the ComEd sponsored study that you received?

**Answer:**

## **NET-TO-GROSS BATTERY**

(LOOP THROUGH A2aa THROUGH N24 UP TO 3 TIMES, ONCE FOR EACH MEASURE)

I'd now like to ask a few questions about the Data Center Project that went through the program.

A2aa. First, I want to confirm that the measures that you installed through the program [READ appropriate category *which has been checked before the interview.*]:

- 1 Replaced existing equipment
- 2 Was added to control or work directly with existing equipment
- 3 Was part of a new construction project
- 4 Other - **Answer:**

N00 In deciding to do a project of this type, there are usually a number of reasons why it may be undertaken. In your own words, can you tell me why you decided to implement the Data Center Project?

**Answer:**

N1 When did you first learn about the Smart Ideas for Your Business Program? Was it BEFORE or AFTER you first began to THINK about implementing the Data Center Project?

- 1 Before
- 2 After
- 3 Other - **Answer:**

N1b Where did the idea for the Data Center Project come from? [IF NEEDED: Did your company develop the idea, was it suggested by a vendor or consultant or the program Service Provider, was it the result of an audit, was it part of a larger expansion or remodeling effort?]

**Answer:**

NN1bb Did you learn about the Smart Ideas for Your Business Program BEFORE or AFTER you DECIDED to implement the Data Center Project?

- 1 Before
- 2 After
- 3 Other - **Answer:**

N1c What role, if any, did firm that conducted the ComEd sponsored study play in the decision to implement the Data Center Project?

**Answer:**

N1d. Were there any other firms or individuals involved in the decision to implement the Data Center Project? If so, who were they?

**Answer:**

Next, I'm going to ask you to rate the importance of the Smart Ideas for Your Business Program as well as other factors that might have influenced your decision to implement the Data Center Project. Think of the degree of importance as being shown on a scale with equally spaced units from 0 to 10, where 0 means not at all important and 10 means extremely important. Now using this scale please rate the importance of each of the following factors in your decision to implement the measure at the time that you did. (If needed: How important in your DECISION to implement the project was...)

N3a. The age or condition of the old equipment **0 to 10 rating:**

N3b. Availability of the incentive from the Smart Ideas for Your Business Program **0 to 10 rating:**

N3bb. Why do you give it this rating? **Answer:**

N3c. Technical assistance you received from Willdan field staff **0 to 10 rating:**

N3cc. Why do you give it this rating? **Answer:**



- N3d. Recommendation from an equipment vendor or contractor that helped you with the choice of the equipment (See answer to V1A for vendor or contractor used) **0 to 10 rating:**
- N3e. Previous experience with this type of equipment **0 to 10 rating:**
- N3f. Information from the Smart Ideas for Your Business Program or ComEd marketing materials **0 to 10 rating:**  
 N3ff. Why do you give it this rating? **Answer:**
- N3g. A recommendation from a design or consulting engineer (See answer to V2A for design or consulting engineer used) **0 to 10 rating:**
- N3i. [if study received] Technical assistance you received from the firm that conducted the ComEd sponsored study (See answer to V3 for SP used) **0 to 10 rating:**  
 N3ii. Why do you give it this rating? **Answer:**
- N3j. Standard practice in your business/industry **0 to 10 rating:**
- N3k. Endorsement or recommendation by your ComEd account manager **0 to 10 rating:**  
 N3kk. Why do you give it this rating? **Answer:**
- N3l. Corporate policy or guidelines **0 to 10 rating:**
- N3m. Payback on the investment **0 to 10 rating:**
- N3n. Objective of minimizing operating cost **0 to 10 rating:**
- N3o. Objective of maximizing facility reliability (5 9s) **0 to 10 rating:**
- N3p. Were there any other factors we haven't discussed that were influential in your decision to implement the Data Center Project?  
**Answer:**  
 [ASK N3ooIF N3o=00]  
 N3pp. Using the same zero to 10 scale, how would you rate the influence of this factor?  
**0 to 10 rating:**

Thinking about this differently, I would like you to compare the importance of the Smart Ideas for Your Business Program with the importance of other factors in implementing the Data Center Project.

[READ IF (N3A, N3D, N3E, N3G, N3J, N3L, N3M, N3N, N3O, OR N3P) = 8,9,10; ELSE SKIP TO N3Q]  
 You just told me that the following factors were important:  
 [READ IN ONLY ITEMS WHERE THEY GAVE A RATING OF 8 or higher]

**Program and Non-program factors**

- (N3A) Age or condition of old equipment,
- (N3B) Availability of the incentive from the Smart Ideas for Your Business Program
- (N3C) Technical assistance you received from Willdan field staff
- (N3D) Equipment Vendor recommendation
- (N3E) Previous experience with this measure
- (N3G) Recommendation from a design or consulting engineer
- (N3I) [if study received] Technical assistance you received from the firm that conducted the ComEd sponsored study

- (N3J) Standard practice in your business/industry
- (N3K) Endorsement or recommendation by your ComEd account manager
- (N3L) Corporate policy or guidelines
- (N3M) Payback on investment
- (N3N) Objective of minimizing operating cost
- (N3O) Objective of maximizing facility reliability (5 9s)
- (N3P) Other factor

N3Q If you were given a TOTAL of 10 points to divide between the importance of the program and the importance of non-program factors, in your decision to implement the Data Center Project how many points would you give to the importance of the Smart Ideas for Your Business Program?  
**Answer:**

N3R And how many points would you give to other non-program factors? [NOTE: the total of N3r and N3s should total 10 points.]  
**Answer:**

\*\*\*\*\*

**CONSISTENCY CHECK ON PROGRAM IMPORTANCE SCORE**

[ASK IF (N3Q>6 AND ALL OF (N3b, N3c, N3f, N3i, AND N3k) = 0,1,2,3), ELSE SKIP TO N4aa]

N4 You just gave <N3Q RESPONSE> points to the importance of the program, I would interpret that to mean that the program was quite important to your decision to install this equipment. Earlier, when I asked about the importance of individual elements of the program I recorded some answers that would imply that they were not that important to you. Just to make sure I have recorded this properly, I have a couple questions to ask you.

N4a When I asked you about the importance of the availability of the Incentive from the Smart Ideas for Your Business Program , you gave a rating of ...<N3B RESPONSE> ... out of ten, indicating that the program incentive was not that important to you. Can you tell me why the incentive was not that important?  
**Answer:**

N4b When I asked you about the importance of the technical assistance you received from Willdan field staff, you gave a rating of ...<N3C RESPONSE> ... out of ten, indicating that the technical assistance was not that important to you. Can you tell me why the information provided was not that important?  
**Answer:**

N4d When I asked you about the importance of Information from the Smart Ideas for Your Business Program or ComEd marketing materials , you gave a rating of ...<N3F RESPONSE> ... out of ten, indicating that this information from the program or utility marketing materials was not that important to you. Can you tell me why this information was not that important?  
**Answer:**

N4e When I asked you about the importance of the technical assistance you received from your Program Service Provider, you gave a rating of <N3I RESPONSE> ... out of ten, indicating that this technical assistance was not that important to you. Can you tell me why this technical assistance was not that important?  
**Answer:**

[ASK IF N3Q<=3 AND ANY ONE OF (N3b, N3c, N3f, N3i, AND N3k)=8,9,10 ELSE SKIP TO N5]

N4aa You just gave <N3Q RESPONSE> points to the importance of the program. I would interpret that to mean that the program was not very important to your decision to install this equipment. Earlier, when I asked about the importance of individual elements of the program I recorded some

answers that would imply that they were very important to you. Just to make sure I understand, would you explain why the program was not very important in your decision to install this equipment? **Answer:**

\*\*\*\*\*

Now I would like you to think about the action you would have taken with regard to the implementation of this Data Center Project if the ComEd Smart Ideas for Your Business Program had not been available.

N5 Using a likelihood scale from 0 to 10, where 0 is “Not at all likely” and 10 is “Extremely likely”, if the ComEd Smart Ideas for Your Business Program had not been available, what is the likelihood that you would have installed exactly the same measures/made the same adjustments? **Answer:**

[ASK IF N5>0, ELSE SKIP TO N8]

N7 Without the program, when do you think you would have installed this equipment? [READ]  
 1 At the same time  
 2 Earlier  
 3 Later  
 4 Never

[ASK IF N7=3]

N7a. How much later would you have implemented the Data Center Project? Would you say...  
 1 Within 6 months  
 2 more than 6 months and up to 1 year later  
 3 more than 1 year and up to 2 years later  
 4 more than 2 years and up to 3 years later  
 5 more than 3 years and up to 4 years later  
 6 more than 4 or more years later

[ASK N7b IF N7a=6]

N7b. Why do you think it would have been more than 4 years later? **Answer:**

\*\*\*\*\*

**CONSISTENCY CHECKS**

[ASK N5a-d IF N3b=8,9,10 AND N5=7,8,9,10]

N5a When you answered ...<**N3B RESPONSE**> ... for the question about the influence of the incentive, I would interpret that to mean that the incentive was quite important to your decision to implement the Data Center Project. Then, when you answered <**N5 RESPONSE**> for how likely you would be to install the same equipment without the incentive, it sounds like the incentive was not very important in your installation decision.

I want to check to see if I am misunderstanding your answers or if the questions may have been unclear. Will you explain the role the incentive played in your decision to install this efficient equipment? **Answer:**

N5b Would you like for me to change your score on the importance of the incentive that you gave a rating of <**N3B RESPONSE**> or change your rating on the likelihood you would implement the Data Center Project without the incentive which you gave a rating of <**N5 RESPONSE**> and/or we can change both if you wish?

- 1 Change importance of incentive rating
- 2 Change likelihood to install the same equipment rating
- 3 Change both
- 4 No, don't change

[ASK IF N5b=1,3]

N5c How important was... availability of the PROGRAM incentive? (IF NEEDED: in your DECISION to

implement the Data Center Project) 0 to 10 likelihood rating:

[ASK IF N5b=2,3]

N5d If the utility program had not been available, what is the likelihood that you would have implemented the Data Center Project? 0 to 10 likelihood rating:

[ASK IF N3J>7]

N6 In an earlier question, you rated the importance of STANDARD PRACTICE in your industry very highly in your decision making. Could you please rate the importance of the PROGRAM, relative to this standard industry practice, in influencing your decision to implement the Data Center Project? Would you say the program was much more important, somewhat more important, equally important, somewhat less important, or much less important than the standard practice or policy?

- 1 Much more important
- 2 Somewhat more important
- 3 Equally important
- 4 Somewhat less important
- 5 Much less important

\*\*\*\*\*

**PAYBACK BATTERY [ASK N8-N10e IF N3M=6,7,8,9,10]**

I'd like to find out more about the payback criteria <COMPANY> uses for its investments.

N8 What financial calculations does <COMPANY> make before proceeding with installation of energy efficiency projects like this one? **Answer:**

N9 What is the payback cut-off point <COMPANY> uses (in months) before deciding to proceed with an investment? Would you say...

- 1 0 to 6 months
- 2 7 months to 1 year
- 3 more than 1 year up to 2 years
- 4 more than 2 years up to 3 years
- 5 more than 3 years up to 5 years
- 6 Over 5 years
- 7 Not applicable

N9a. Would your answers regarding your company's financial calculations and cut-off points for energy efficiency projects be the same for the next 2 measures <MEASUREx<sub>2</sub>>, ,MEASUREx<sub>3</sub>> that I will be asking you about shortly?

- 1 Yes
- 2 No

N10a What was the estimated payback period for the Data Center Project, in months, WITH the incentive from the <PROGRAM>?

**Answer:**

N10b And what was the estimated payback period for the Data Center Project, in months, WITHOUT the incentive from the ComEd Program?

**Answer:**

\*\*\*\*\*

**CONSISTENCY CHECK**

[ASK IF the project payback is met even without the incentive]

N10c Excluding the incentive, the Data Center Project met <COMPANY>'s financial criteria. Would you

have gone ahead with it even without the incentive?

**Answer:**

[ASK IF the project payback is met only with the incentive yet they indicate low incentive importance in decision making.]

N10d The incentive seemed to make the difference between meeting your financial criteria and not meeting them, but you are saying that the incentive didn't have much effect on your decision, why is that? **Answer:**

[ASK IF the project payback didn't cause the measure to meet the financial criteria AND N3b=8,9,10]

N10e. The incentive didn't cause the Data Center Project to meet <COMPANY>'s financial criteria, but you said that the incentive had an impact on the decision to implement the Data Center Project. Why did it have an impact? **Answer:**

\*\*\*\*\*

[ASK ALL]

N10aa Did the incentive play an important role in moving the Data Center Project within the acceptable payback cutoff point?

- 1 Yes
- 2 No
- 88 Refused
- 99 Don't know

**CORPORATE POLICY BATTERY [ASK N11-N17 IF N3L=6,7,8,9,10]**

N11 Does your organization have a corporate environmental policy to reduce environmental emissions or energy use? Some examples would be to "buy green" or use sustainable approaches to business investments.

**Answer:**

[ASK N12-N17 IF N11=YES]

N12 What specific corporate policy, if any, influenced your decision to implement the Data Center Project through the ComEd's Smart Ideas for Your Business Program?

**Answer:**

N13 Did that policy cause you to adopt energy efficient measures at this facility before participating in ComEd's Smart Ideas for Your Business Program?

**Answer:**

N14 Had that policy caused you to adopt energy efficient measures at other facilities before participating in ComEd's Smart Ideas for Your Business Program?

**Answer:**

[ASK IF N13=YES OR N14=YES]

N15 Did you receive an incentive for a previous installation of energy saving equipment in your Data Center(s)?

**Answer:**

[ASK IF N15=YES]

- N16 To the best of your ability, please describe....
- a. the amount of incentive received
  - b. the approximate timing
  - c. the name of the program that provided the incentive

[ASK IF N13=YES OR N14=YES]

N17 If I understand you correctly, you said that <COMPANY>'s corporate policy has caused you to install energy efficient measures previously at this and/or other facilities. I want to make sure I fully understand how this corporate policy influenced your decision versus the ComEd Smart Ideas for Your Business Program. Can you please clarify that?

**Answer:**

**STANDARD PRACTICE BATTERY** [ASK N18-N22 IF N3i=6,7,8,9,10]

N18 Approximately, how long has use of energy efficient measures in Data Centers been standard practice in your industry?

**Answer:**

N19 Does <COMPANY> ever deviate from the standard practice for energy efficient measures in their Data Centers?

**Answer:**

[ASK IF N19=YES]

N19a Please describe the conditions under which <COMPANY> deviates from this standard practice?

**Answer:**

N20 How did this standard practice influence your decision to implement the Data Center Project through ComEd's Smart Ideas for Your Business Program?

**Answer:**

N20a Could you please rate the importance of ComEd's Smart Ideas for Your Business Program, versus this standard industry practice in influencing your decision to implement the Data Center Project? Would you say ComEd's Smart Ideas for Your Business Program was...

- 1 Much more important
- 2 Somewhat more important
- 3 Equally important
- 4 Somewhat less important
- 5 Much less important

N21 What industry group or trade organization do you look to establish standard practice for your industry?

**Answer:**

N22 How do you and other firms in your industry receive information on updates in standard practice?

**Answer:**

**DESIGN ASSISTANCE**

N23 Who provided the most assistance in the design or specification of the Data Center Project you implemented through ComEd's Smart Ideas for Your Business Program?

**Answer:**

N24 Please describe the type of assistance that they provided.

**Answer:**

**[END NTG MEASURE 1-3 LOOP]**

**ADDITIONAL PROJECTS**

[ASK IF MSAME=1]

Our records show that <COMPANY> also received an incentive from Smart Ideas for your Business ComEd for <NSAME> other measures in the data center [READ LIST OF MEASURES].

N26 Was it a single decision to complete all of those Data Center projects for which you received an incentive from Smart Ideas for your Business or did each project go through its own decision process?

- 1 Single Decision
- 2 Each project went through its own decision process
- 77 Other, specify
- 88 Refused
- 99 Don't know

[ASK IF FSAME=1]

Our records show that <COMPANY> also received an incentive from Smart Ideas for your Business for a <FDESC> project at <ADDRESS>.

N27 Was the decision making process for the <FDESC> project the same as for the data centers project we have been talking about?

- 1 Same decision making process
- 2 Different decision making process
- 77 Other, specify
- 88 Refused
- 99 Don't know

## Spillover Questions

Thank you for discussing the new data center measures that you installed through the Smart Ideas for your Business program. Next, I would like to discuss any energy efficient equipment you might have installed OUTSIDE of the program.

SP1 Since receiving a rebate for the project(s) we just discussed, did you implement any ADDITIONAL energy efficiency measures at this facility or at your other facilities within ComEd's service territory that did NOT receive incentives through any utility or government program?

**Answer:**

SP1a. Do you plan to apply for incentives for these energy efficiency measure(s) through a utility or government program in the future?

- 1 Yes
- 2 No

SP1b. Which program(s) do you plan to apply to for incentives for these measures?

- 77 Record VERBATIM

SP1c. Approximately when do you plan to apply for incentives through these programs?

- 77 Record VERBATIM

[ASK SP2-SP7i IF SP1=yes, ELSE SKIP TO S0]

SP2 What measures did you implement?

**Answer:**

**[LOOP FOR EACH MEASURE MENTIONED]**

SP5 I have a few questions about the measure that you installed. (If needed, read back measure.)

- a. Can you briefly explain why you decided to install this energy efficiency measure(s) on your own, rather than going through a utility or government incentive program?
- b. Why did you not install this measure through the ComEd Program?
- c. How many of this measure did you install?
- d. Please describe the SIZE, TYPE, and OTHER ATTRIBUTES of this measure.

e. Please describe the EFFICIENCY of this measure.

SP5f. Was this measure specifically recommended by a program related audit, report or program technical specialist?

**Answer:**

SP5g. How significant was your experience in the ComEd Program in your decision to implement this Measure, using a scale of 0 to 10, where 0 is not at all significant and 10 is extremely significant?

**0 to 10 rating:**

SP5h. Can you explain specifically how your experience with the Smart Ideas for your Business program influenced your decision to install this additional high efficiency measure(s)?

**Answer:**

SP5i. If you had not participated in the Smart Ideas for your Business program, how likely is it that your organization would still have implemented this measure, using a 0 to 10, scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure? [SCALE 0-10; 88=Refused; 99=Don't Know] **0 to 10**

**rating:**

**[END LOOP FOR EACH MEASURE MENTIONED]**

## Process Questions

I'd now like to ask you a few general questions about your participation in the Smart Ideas for Your Business program.

P1 What do you believe the Program's primary strengths are?

**Answer:**

P2 What concerns do you have about the Program?

**Answer:**

P3 Do you have any suggestions for ways to improve the program?

**Answer:**

END: That concludes the survey. On behalf of ComEd, thank you very much for your time.



### 6.3 Technical Service Providers Survey Instrument

#### **Technical Services Provider NTG Survey Instrument – for ComEd Custom Programs – Data Center version – PY8**

##### Introduction

AA1 Hello, this is \_\_\_\_\_ from Itron calling on behalf of ComEd. THIS IS NOT A SALES CALL. I am calling about your firm's recent involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY\_DATE>... Our records indicate that ...<%CONTACT>... would be the person most knowledgeable about this. Is he/she available?

- 1 Yes AA5
- 2 No AA2
- 88 Refused Thank and Terminate
- 99 Don't know Thank and Terminate

AA2 Who would be the person most knowledgeable about your firm's involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY\_DATE>?

- 1 Record name AA3
- 88 Refused Thank and Terminate
- 99 Don't know Thank and Terminate

AA3 May I speak with him/her?

- 1 Yes AA4
- 2 No (not available right now) SCHEDULE APPOINTMENT

AA4 Hello, this is \_\_\_\_\_ from Itron calling on behalf of ComEd...THIS IS NOT A SALES CALL. I was told that you are the person most knowledgeable about your firm's involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY\_DATE>. \_\_Is this correct?

- 1 Yes A2
- 2 No, there is someone else (RECORD NAME AND ASK TO BE TRANSFERRED) AA5
- 3 No and I don't know who to refer you to Thank and Terminate
- 88 Refused Thank and Terminate
- 99 Don't know Thank and Terminate

AA5 Am I speaking with ..<%BETTER\_CONTACT> ...the representative of your company that worked with ...<%CUSTOMER>... during the time that your firm conducted a technical assessment study sponsored by ComEd? This study was conducted on approximately... <%STUDY\_DATE>.

- 1 Yes A2
- 2 Yes, but we need to make an appointment. Reschedule appt.
- 3 No but I will give you to the correct person. AA4
- 88 Refused Thank and Terminate
- 99 Don't know Thank and Terminate

Before we start, I would like to inform you that for quality control purposes, this call may be monitored by my supervisor. For the sake of expediency, we will be recording this interview.

A1 <%CUSTOMER>... has indicated that your firm conducted a technical assessment study sponsored by ComEd in which you recommended that they install <MEASURE>. \_\_\_Is this correct?...

1	Yes	A2
2	No	Thank and Terminate
88	Refused	Thank and Terminate
99	Don't know	Thank and Terminate

*[READ] For the sake of expediency, during the balance of the interview, we will be referring to the <%PROGRAM> as the PROGRAM and we will be referring to the installation of ... <%MEASURE> as the MEASURE. I will repeat this from time to time during the interview as your organization may have installed more than one measure through more than one program.*

I am going to ask you to rate the importance of the ComEd Smart Ideas for Your Business in influencing your decision to recommend this <%MEASURE> to ...<%CUSTOMER>.. Think of the degree of importance as being shown on a scale with equally spaced units from 0 to 10, where 0 means not at all important and 10 means very important, so that an importance rating of 8 shows twice as much influence as a rating of 4.

V3 Using this 0 to 10 likelihood scale where 0 is NOT AT ALL LIKELY and 10 is EXTREMELY LIKELY, if the ComEd Smart Ideas for Your Business PROGRAM, including incentives as well as program services and information, had not been available, what is the likelihood that you would have recommended this specific <%MEASURE> to ...<%CUSTOMER>?

#	Record 0 to 10 score (_____) V4
88	Refused V4
99	Don't know V4

V4 Approximately, in what percent of sales situations did you recommend this <%MEASURE> before you became involved with the ComEd Smart Ideas for Your Business PROGRAM?

%	Record PERCENTAGE V5
88	Refused V5
99	Don't know V5

V5 And approximately in what percent of sales situations do you recommend this <%MEASURE> now that you have worked with the ComEd Smart Ideas for Your Business PROGRAM?

%	Record PERCENTAGE V6a
88	Refused V6a
99	Don't know V6a

V6a In what other ways has the ComEd Smart Ideas for Your Business PROGRAM influenced your recommendation that a customer install this <%MEASURE>?

1	Record FIRST mention V6aa
2	Record SECOND mention V6aa
3	Record THIRD mention V6aa
4	No other way V7a
88	Refused v7a
99	Don't know V7a

IF V6a not '.' THEN ASK, ELSE V6ab

V6aa Using a 0 to 10 scale, how important was <%FIRST\_MENTION> in your recommendation that a customer install this <%MEASURE>?

#	Record 0 to 10 score (_____) V6b
88	Refused V6b
99	Don't know V6b

IF V6a not '.' THEN ASK, ELSE V6ac

V6ab Using a 0 to 10 scale, how important was <% SECOND \_MENTION> in your recommendation that a customer install this <%MEASURE>?

# Record 0 to 10 score (\_\_\_\_\_) V6b  
 88 Refused V6b  
 99 Don't know V6b

IF V6a not '.', THEN ASK, ELSE V7a

V6ac Using a 0 to 10 scale, how important was <% THIRD \_MENTION> in your recommendation that a customer install this <%MEASURE>?

# Record 0 to 10 score (\_\_\_\_\_) V6b  
 88 Refused V6b  
 99 Don't know V6b

V7b And how important was the information provided by the ComEd website in your recommendation that a customer install this MEASURE?

# Record 0 to 10 score (\_\_\_\_\_) V7c  
 88 Refused V7c  
 99 Don't know V7c

V7c And how important was your firm's past participation in an incentive or audit program sponsored by ComEd in your recommendation that a customer install this MEASURE?

# Record 0 to 10 score (\_\_\_\_\_) V8  
 88 Refused V8  
 99 Don't know V8

IF VENDOR ALSO STOCKS AND SELLS PROGRAM QUALIFYING <%MEASURE> THEN ASK. ELSE SKIP TO V9.

V8 Approximately, what percentage of your sales over the last 12 months of this...<%MEASURE > installed in ComEd 's service territory are energy efficient models...that qualify for incentives from the program?

% Record PERCENTAGE V9  
 88 Refused V9  
 99 Don't know V9

V9 In what percent of sales situations do you encourage your customers in ComEd 's service territory to purchase this program qualifying ...<%MEASURE >...?

% Record PERCENTAGE V9a  
 88 Refused V10  
 99 Don't know V10

IF V9 < 100% THEN ASK. ELSE V10.

V9a In what situations do you NOT encourage your customers to purchase this program qualifying ...<%MEASURE >...? And why is that?

77 RECORD VERBATIM V10  
 88 Refused V10  
 99 Don't know V10

V10 Of those installations of ...<%MEASURE >... in ComEd 's service territory that qualify for incentives, approximately what percentage do not receive the incentive?

% Record PERCENTAGE V11  
 88 Refused V12  
 99 Don't know V12

IF V10 >> 0;

V11 Why do you think they do not receive the incentive?

- 77 RECORD VERBATIM V12
- 88 Refused V12
- 99 Don't know V12

V12 Do you also sell ...<%MEASURE> in areas where customers do not have access to incentives for energy efficient equipment?

- 1 Yes V13
- 2 No V14
- 88 Refused V14
- 99 Don't know V14

IF VENDOR ALSO STOCKS AND SELLS PROGRAM QUALIFYING <%MEASURE> THEN ASK. ELSE SKIP TO V15.

V13 About what percent of your sales of program-qualifying...<%MEASURE > ... are represented by these areas where incentives are not offered?

- % Record PERCENTAGE V14
- 88 Refused V14
- 99 Don't know V14

V14 Have you changed your stocking practices for <%MEASURE> as a result of ComEd 's Program? [IF NEEDED: BY STOCKING PRACTICES, I MEAN THE TYPES OF EQUIPMENT YOU SUPPLY AND SELL IN ComEd 's SERVICE TERRITORY.]

- 1 Yes V15
- 2 No V15
- 88 Refused V15
- 99 Don't know V15

IF V12=1

V15 Do you promote energy efficient equipment, such as <%MEASURE>, equally in areas with and without incentives??

- 1 Yes V16
- 2 No V16
- 88 Refused V16
- 99 Don't know V16

V16 Do you know of any other vendors that worked with ...<%CUSTOMER>... during their implementation and/or installation of ...<%MEASURE>, for example engineers or designers?

- 1 Yes V16a
- 2 No V17
- 88 Refused V17
- 99 Don't know V17

V16a Do you have their business name?

- 77 RECORD Business name and contact's name and phone number(s) V17
- 88 Refused V17
- 99 Don't know V17

V17 [IF NEEDED] And finally, for verification purposes only, may I please have your first name?

- 77 RECORD VERBATIM END

END Those are all the questions I have for you today. Thank you very much for your time.

END OF SURVEY